A new species of Allium sect. Codonoprasum from Sierra Nevada (Spain)

S. BRULLO, P. PAVONE & C. SALMERI

Abstract:
BRULLO, S., PAVONE, P. & SALMERI, C.: A new species of Allium sect. Codonoprasum from Sierra Nevada (Spain). – Sendtnera 3: 95–100. 1996. – ISSN 0944–0178.

A new species of *Allium* sect. *Codonoprasum*, *Allium valdesianum,* is described and illustrated. *A. valdesianum* occurs in the alpine belt of the Sierra Nevada, S Spain and grows there on rocky pastures. Its karyology, leaf anatomy and taxonomical relationships are discussed.

Zusammenfassung:
Eine neue Art von *Allium* sect. *Codonoprasum*, *Allium valdesianum* wird beschrieben und illustriert. *A. valdesianum* kommt in der alpinen Zone der Sierra Nevada, Südspanien vor und besiedelt dort Felsfluren. Seine Karyologie, Blattanatomy und taxonomischen Beziehungen werden diskutiert.

Introduction

In the frame of a cytotaxonomical research on the *Allium paniculatum* group, an orophilous population coming from Sierra Nevada (S Spain), occurring on the rocky pastures at about 2500 m, has been examined. According to the literature data (PASTOR & VALDÉS 1983) and herbarium investigations, the specimens of this *Allium* were attributed to *A. paniculatum* L. or to *A. pallens* L. Effectively, it differs substantially from the other Mediterranean populations belonging to the *A. paniculatum* cycle in numerous characters regarding the habit and the flower morphology. In particular, it shows a small size (max. 16 cm high) keeping in the cultivated plants, leaves normally longer than the stem, inflorescence hemispherical, very dense, and short flower pedicels.

Therefore, this *Allium* is proposed as a species new to science and dedicated to Benito Valdés, botanist of Seville University and author of numerous taxonomic contributions to the Iberian flora.

Previously, in a comunication concerning this species (BRULLO et al., 1993), it was named *A. nevadense,* but it is not possible to use the specific epithet "*nevadense*" because another species of *Allium* was already described with this name from N America (REGEL, 1875).

Material and methods

The investigation was based on specimens collected in Sierra Nevada (locus classicus) and cultivated in the Botanical Garden of Catania. In addition to personal collections and field observations a lot of material from various herbaria was examined (CAT, FI, G, M, MA, SEV). For the karyological study, root-tips of bulbs were pretreated with 0,3% colchicine, fixed in Carnoy and stained according to the Feulgen technique. The leaf anatomy was studied on cultivated material, which was fixed in Karpetschenko and embedded in paraffin; the transversal sections were stained with ruthenium red and lightgreen yellowish.

Allium valdesianum Brullo, Pavone & Salmeri, **sp. nov.**

Holotypus: Spagna, Sierra Nevada, presso Albergo Universitario, a c. 2500 m di quota, esemplare coltivato, 28.7.1989, *Brullo s.n.* (CAT; Iso: CAT, FI, M).

Fig. 1

Bulbus ovoideus, 10–12 × 8–10 mm, tunicis externis membranaceis, brunneis, internis hyalinis, albidis. Scapus solitarius, 10–16 cm altus, glaber, teres, erectus, vaginis foliorum per 1/2–1/3 longitudinis tectus. Folia 3–4, glabra, viridia, 6–20 cm longa et 1–2,5 mm lata, costata, semicylindrica, inflorescentia longiora. Spatha bivalvis, persistens, umbella longiora, valvis inaequalibus, longe caudatis, 5-nervatis, liberis, maiore 3–7 cm longa, minore 2–3,5 cm longa. Inflorescentia globosa, densa, multiflora, pedicellis subaequalibus, max. 1 cm longis. Bostryces 12. Perigonium campanulatum, 5–5,5 mm longum, tepalis albo-viridibus, purpura suffusis, venis medianis purpureis, oblongo-ellipticis, ad apicem rotundatis, saepe breviter apiculatis, 2,2–2,5 mm latis. Stamina tepalis breviora, filamentibus simplicibus, albo-purpurescentibus, interioribus 2–2,7 mm longis, exterioribus 1,5–2 mm longis, inferne cum tepalis per 1,5–1,6 mm in annulum connatis, antheris oblongis, albo-luteolis, 1,2–1,3 × 0,6–0,8 mm. Ovarium ellipticum vel elliptico-subcylindricum, papillosum superne, 3,8–4 × 1,5–2 mm. Stylus albus, 0,2–0,4 mm longus. Capsula trivalvis, globoso-obovoidea, 5 × 5 mm.

Bulb ovoid, 10–12 × 8–10 mm, with outer tunics membranaceous, brown, the inner hyaline, whitish. Stem 10–16 cm high, glabrous, erect, cylindric, covered for 1/2–1/3 of its length by the leaf sheaths, often provided with a cluster of leaves in the most inner leaf sheath. Leaves 3–4, glabrous, green, with a linear blade, semicylindrical, 1–2.5 mm wide, 6–20 cm long, ribbed, longer than the inflorescence. Spathe longer than inflorescence, with 2 valves separate, unequal, 5-nerved, with a long appendage, the large 3–7 cm long, the small 2–3.5 cm long. Inflorescence globose, dense, many-flowered, with flowers arranged in 12 bostryces. Pedicels subequal max. 1 cm long. Perigon campanulate, 5–5.5 cm long, with tepals white-greenish tinged with purple, with purplish mid-vein, oblong-elliptical, rounded at the apex, often shortly apiculate, 2.2–2.5 mm wide. Stamens included, with filaments white-purplish, the inners 2–2.7 mm long, the outers 1.5–2 mm long, anthers oblong, white-yellowish, 1.2–1.3 × 0.7–0.8 mm. Ovary elliptical to elliptical-subcylindrical, papillose in the upper part, 3.8–4 × 1.5–2 mm, with style white 0.2–0.4. Capsule trigone, globoso-obovoid, 5 × 5 mm.

Specimens seen:

Spain. Prov. Grenada: Sierra Nevada: *Boissier* (G) – ibid., in Cerro de Los Monjos, *Pau* (MA) – ibid., 11.8.1908, *Pau* (MA) – ibid., region alpines au Peon, 26.7.1851, *Bourgeau*

1495a (FI-W, G, K, P) – ibid., Umgebung des Albergue Universitario, 24.7.1969, *Hertel 10929* (M) – ibid., presso Albergo Universitario, 29.9.1988, *Bartolo & Brullo* (CAT) – ibid., a c. 2500 m di quota, esemplare coltivato, 28.7.1989, *Brullo s.n.* (CAT, FI, M) – ibid., Peon de San Francisco, 21.7.1978, *Pastor* (SEV) – ibid., Veleta, 21.7.1978, *Cabezudo et al.* (SEV) – ibid., Bco. d'Ohanes, cult., 31.7.1927, *Lofthouse* (BM) – ibid., Minas de Beíres, 10.7.1927, *Lofthouse* (BM).

Karyology

A. valdesianum is a diploid species with 2n = 16 (fig. 2). Its chromosome complement is characterized by 7 metacentric pairs (3 of which microsatellited) and 1 submetacentric pair (fig. 3). Consequently, its chromosome formula is:

$$z = 2n = 2x = 16\text{:}\ \ 8\ \mathrm{m} + 6\ \mathrm{m}^{t} + 2\ \mathrm{sm}.$$

According to literature data and unpublished personal data, this count is very common in numerous diploid populations of the *Allium paniculatum* group; there are, however, some differences in the size and the shape of the chromosomes, which allow to distinguish it well from the other known species belonging to this group (TZANOUDAKIS 1986; TZANOUDAKIS & VOSA 1988; ÖZATHAY 1990, 1993).

Leaf anatomy

The transversal section of the leaf shows an epidermis covered by a thin layer of cuticle with stomata distributed on the whole surface. The one-layered palisade tissue is regular and compact with cylindrical cells, while the sponge tissue is formed by big and vacuolate cells with numerous secretory canals in the periferical part. The number of vascular bundles is 11–12, of which 5–6 are abaxial and 6 adaxial (fig. 4).

Conclusion

Herbarium data and personal field observation show that *A. valdesianum* is localized in the alpine belt above 2400 m on siliceous substrata, where it grows in rocky pastures.

For the occurrence of spathe longer than the inflorescence, simple stamen filaments and ovary with inconspicuous nectaries, *A. valdesianum* belongs to *A.* sect. *Codonoprasum* Reichb. Within this section, *A. valdesianum* is closely related to the taxa of the *A. paniculatum* group, mainly because of the membranaceous bulb-tunics, leaves glabrous and semicylindrical, spathe valves with a long appendage and stamens shorter than the perigon. Besides, due to the small size and the summer flowering period, it shows some resemblance with some orophilous species of the sect. *Codonoprasum*, as *A. parnassicum* (Boiss.) Halacsy from Greece and *A. sibthorpianum* Schultes & Schultes f. from Turkey.

As concerns its origin, *A. valdesianum* arose probably from diploid populations of *A. paniculatum* s. l. in consequence of adaptation to a very cold climate conditions of cryo-mediterranean type, which caused a remarkable delay in the flowering period. On the whole, this species, which can be considered an old taxon, evolved, as the most of the endemics of Sierra Nevada, during the Tertiary for isolation processes mainly of reproductive type.

Acknowledgements

Financial support by Italian M.U.R.S.T. (40%) is gratefully acknowledged.

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Prof. Salvatore BRULLO, Prof. Pietro PAVONE, Dr. Cristina SALMERI, Dipartimento di Botanica, via A. Longo 19, I–95125, Catania, Italia.

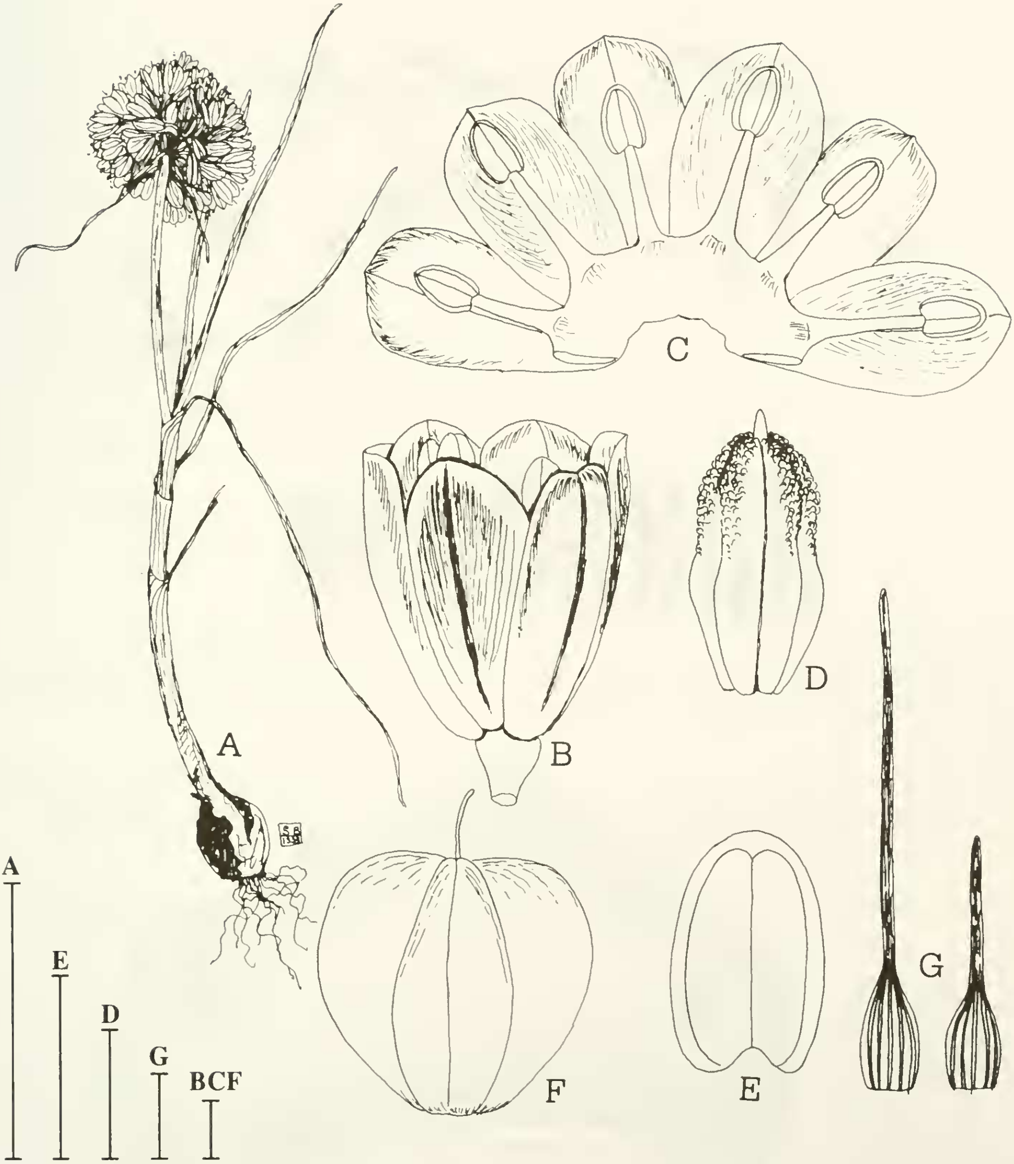
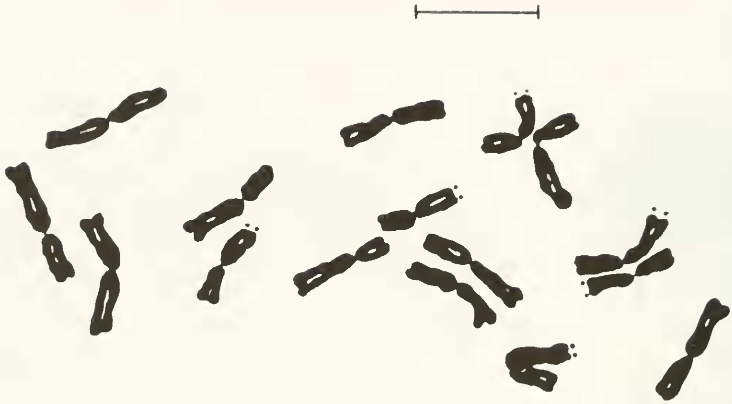


Fig.1. *Allium valdesianum* Brullo, Pavone & Salmeri – A: Habit. B: Flower. C: Perigon with stamens. D: Ovary. E: Anther. F: Capsule. G: Spathe valves.
Scale bars: A: 5 cm; B, C, E, F: 1 mm; D: 2 mm; G: 1 cm.



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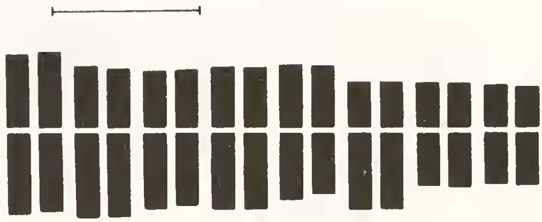

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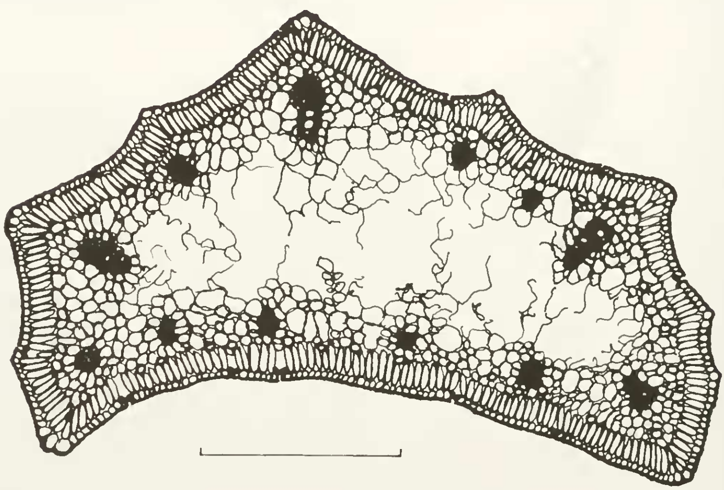

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Fig. 2. Mitotic metaphase plate of *A. valdesianum* (from the type locality).
Fig. 3. Karyogram of *A. valdesianum*
Fig. 4. Leaf cross section of *A. valdesianum* (from the type locality).
Scale bars: Fig. 2, 3: 10 μm; fig. 4: 0.5 mm.